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CREATING REGIONAL TRAINING PROGRAMS: A LESS DEVELOPED COUNTRIES' PERSPECTIVE

ABSTRACT

One of the challenges of the next millennium will be having to compete in a global market and yet with the limited resources. This will certainly call for new strategies and innovations, especially in the field of aviation training. With today's highly advanced aerospace equipment and operational procedures, the cost and complexity of aviation training have continued to escalate. Evidently, this trend will continue with time. Thus, government authorities, air carriers, and other stakeholders will have to explore new avenues to contain the situation. One option might be to lower the training standards, but the cost, in terms of aviation safety, will be ironically higher.

By far, the best alternative will be the current fever of commercial marital affairs, alliances, and regional groupings. Early indications are that creating regional training programs will benefit less developed countries (LDCs) and more developed countries (MDCs) alike. This is how such arrangements, with regard to aviation training, can benefit both LDCs and MDCs. Regardless of how nationalistic individual countries may feel, aviation is, by default, an international business. In addition, no country or bloc of countries can afford to be in isolation.

INTRODUCTION

Not too long from now, in the next three short months, the world community will be celebrating the, much talked about, Year 2000. That year will conclude the twentieth century and usher in the new millennium. Evidently, the 21st Century will present its unique problems and challenges. And, I believe one of the challenges will be to compete in a global market, despite the limited resources at our disposal. This will certainly call for new business strategies and innovative ideas, especially with regard to aviation training programs. Admittedly, those concerned with the design, implementation, and management of aviation training programs will have to come up with some effective packages. For this reason, I suggest now is the ideal time to look back, take stock, and prepare for the hard times ahead.

Of late, the aerospace industry has experienced rapid technological advancements. This has led to exponential increase of aviation training cost and complexity. Seemingly, this *status quo* might remain unchanged for quite sometime to come. As a result, government regulatory authorities, international air carriers, fixed-base operators (FBOs), and other stakeholders will have to make hard decisions. They'll have to consider several options in order to ensure continued and

effective training of their aviation personnel.

While considering the various options, some may be tempted to think of lowering the training standards. Ironically, such an action could prove to be very costly in terms of aviation safety. In my opinion, the best alternative will be to consider the current fever of business inter-marital affairs, alliances, and regional groupings. In this paper, I give a brief historical overview of aviation training, assess the latest trends in the global aerospace industry, and critically examine the implications of creating regional training programs.

A HISTORICAL OVERVIEW

Unfortunately, I don't have the brains of Albert Einstein, Isaac Newton, or any of the world's geniuses. Thus, I can't answer the question, "What came first, chicken or egg?" Similarly, I cannot say, with certainty, if aviation training preceded or succeeded aerospace engineering/maintenance/operation, for instance. I think even an imaginary trip to Kitty Hawk, South Carolina, may still leave us puzzled. However, if such an imaginary journey was to take us beyond, to the bicycle factory, then we might find the answer. Evidently, both Orville and Wilbur, the pioneers of powered flight, had ample technical training before trying their hand at any aviation project.

Four Cycles of Aviation Training
I want to submit that in aerospace, the technical training programs have evolved through what I propose to call the "Four Cycles of Aviation Training."

First, long before the modern day aviation training centers, like Oxford Air Training School (OATS), Oxford, UK, and air universities, like Embry-Riddle Aeronautical University, Florida or Arizona, US, the would-be aviation professionals had to go through apprenticeship programs. These were intensive work-as-you-learn kind of programs. With this approach, men and women were trained for years until they mastered their trade skills. This was the first cycle of aviation training.

Second, as time went on and the aviation industry became more sophisticated, those in the training management began to notice some shortcomings. It became obvious that some theoretical background was lacking among the apprentice school graduates. This led to the establishment of the traditional classroom instruction, the second cycle.

Third, for some reason, the classroom-type instruction seemed to produce more theory at the expense of practical know-how. This state of affairs led to the introduction of on-the-job training (OJT), the third cycle. The purpose of OJT was to augment the theoretical knowledge gained from the classroom.

Last, by the time OJT became the norm, aviation was highly complex. Thus, it was a little risky to subject the highly automated systems and components to the inexperienced trainees to learn on. So, as an attempt to actually combine all the three earlier stages or cycles, the fourth cycle evolved. This was the computer-based training (CBT), the last cycle that will actually propel aviation training into the new millennium. With CBT, an Air Traffic Controller (ATC), for instance, can simulate various

scenarios that would otherwise be impossible on live systems. Similarly, a defect can be simulated for the aircraft mechanic to troubleshoot, identify, and fix. Not only is the CBT more effective, but it also comes in color and perfect sound, thanks to the multimedia technology. Below is a model of the theory proposed above.
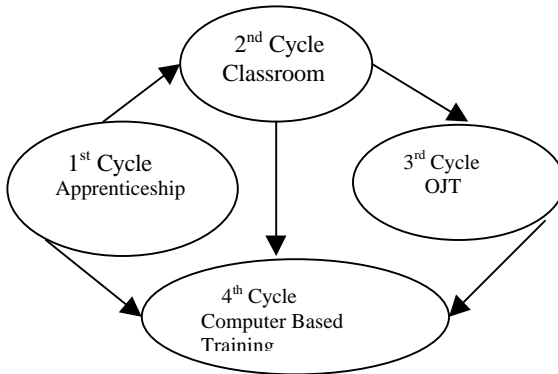

Figure1: Four Cycles of Aviation Training

Removal of International Barriers
The last point to note, with regard to the historical overview, is that during the second cycle era, very few countries had aviation training centers. For the most part, it was the MDCs that had such facilities. Thus, the LDCs had to depend on MDCs for their aviation training needs. The problem was that those with the training centers had many restrictions. Either admission was reserved for citizens only or subsequent renewal or update of qualifications (i.e., licenses, certificates, etc.) was virtually impossible for international graduates. To my knowledge, the US was one of the few MDCs, if not the only one, which did not impose such restrictions. In any case, it is my hope that with globalization, characterized by the removal of international trade barriers, this aviation barrier will also be removed eventually.

ASSESSMENT OF LATEST TRENDS IN AEROSPACE

In the 21st Century, we're going to face numerous challenges posed by different pressure groups. For example, the environmental groups will continue to mount pressure on various sectors including aviation. Beside the environmental issues, there are other factors of concern, which will also affect or influence some aspects of the aviation training programs globally. Thus, of the many challenges to be faced by the aerospace industry, three are discussed here. They are the environmental concerns in aviation, aviation automation, and human factors in aviation.

Environmental Concerns in Aviation
By the time environmental awareness was beginning to gain ground, aerospace industry became the primary suspect as the main cause of the environmental degradation. On the one hand, there was a problem of noise pollution. Aircraft, especially those equipped with gas turbine engines, were considered the major sources of noise. In their consultancy report on the environmental impact, Sefe, Chanda, Magole, Perkins, and Segobye, identify aircraft as the worst source of noise pollution around the airports[6]. They further suggest that people in the vicinity of airports are affected and that aircraft noise may "even affect an individual's well-being"[6]. On the other hand, because of the emissions from aircraft engines, aviation was suspected to be responsible for the depletion of the Ozone Layer, for instance. Incidentally, the main gases emitted by aircraft engines are reported to be carbon monoxides, hydrocarbons,

and nitrogen oxides[6]. According to Sefe and his associates, estimated concentrations of those pollutants are not significant as they "do not exceed 700 parts per million"[6]. Aside from the problems of noise pollution and aircraft engine emissions, there are other issues of concern with regard to aviation practices. First, there is the question of halogenated gases, for example. In the late 1970s, when I first joined aviation, as an aircraft fire fighter trainee, Bromochlorodiflouromethane (BCF) was regarded the most effective fire fighting agent available. Little did we know, then, that it was actually one of the gases, which are more destructive to the Ozone Layer. Today, all halon-type gases are being phased out, states are only to use the existing supplies and never to place new orders after that. The big question remains though, "What will be the possible replacements?"

Second, it's vital for aviation professionals to practice what some environmentalists have termed the three Rs: Reduce, Reuse, and Recycle. Reduce simply means we are to reduce our consumption of the non-replenishable resources. Reuse refers to the repetitive use of the same commodity, as far as possible, to avoid waste and disposal of litter. Recycle is perhaps self-explanatory, the reprocessing of a resource to reproduce it into a slightly or completely different form for similar or another use. With regard to recycling and waste management, there are three areas of specific concern in aviation. The first one has to do with the disposal of aviation fluids, like oil, grease, etc. For a long time, most aviation experts did not practice proper waste management when disposing these. But now time has come for this to be reviewed, because the situation cannot continue unchecked. The second area concerns the disposal of rubberized materials like tires, flexible hozes, grommets and rubber clamps, seals, fuel tank bladders, and others. My colleague is exploring the possibility of recycling these items and use the end product to cushion corrugated iron sheets, which are used for roofing in our part of the world[4]. If his theory could pass the test, such cushioning or covering may have two effects. On the one hand, it'll serve as a sound barrier during rain, especially hail storms. Thus, occupants of structures using that type of roofing would enjoy their sleep even during the rainy nights. On the other hand, it may create a green house type of effect. During the day, this covering may absorb the solar energy and possibly dissipate it through the iron sheets into the house. At night, when it's extremely cold, the iron sheets will reflect the escaping heat energy back into the house and, thus, keep its occupants warm during the cold winter nights. The only problem with this theory, however, is "What will happen during summer?" Anyway, that's for the research to find out, but I found it to be an interesting theory myself. And, this is how aviation experts must think like in the 21st Century. The last one concerns the handling of discarded components like cylinders, pistons, etc. As a matter of safety precaution, airworthiness authorities used to encourage physical destruction of such parts once declared unserviceable. This was an attempt to prevent such unairworthy components from finding their way back into the system and possibly leading to accidents or incidents that could have been otherwise avoided.

In the next century, all the practices or habits highlighted above will have to change. Those vested with the responsibilities of designing, developing, and managing aviation training programs will have to review these practices in the light of current environmental philosophies and policies. In addition to these and other environmental or ethical issues, future training requirements will have to take into account the latest state-of-the-art technologies in the aerospace industry.

Aviation Automation
Nowadays, aviation is different from what it was during the humble beginnings of the Wright brothers. Aviation or cockpit automation has become the normal feature of most air carriers' operations. For some time now, the phrase "glass cockpit (GC)" has been coined to describe the present state of technological advances. Let me assume that an attempt to define relevant terms, here, is appropriate. Automation is defined as "the assignment to machinery, by choice of crew, of some tasks or portion of tasks performed by the human crew to machinery."[1] In my senior thesis at Embry-Riddle Aeronautical University, Florida, I indicated that GC aircraft family includes those airplanes with Electronic Flight Instrument System (EFIS) and other similar and advanced devices[5].

Another area in which aviation automation will become visible is the "Free Flight (FF)" concept. When this concept finally gets airborne, communication between airplanes and air traffic control centers will be handled mainly by computers. The traditional ATCs will effectively become computer engineers or specialists. Besides, instead of being controllers as it has been the custom, they'll simply become managers of the air traffic system. Hence, under the FF concept, the term used is air traffic management (ATM) as opposed to air traffic control.

In any case, just as the man or woman in-charge of the flight deck has been reduced from being a flight commander to being a manager of the flight system, so is the traditional ATC. This transition will certainly have its own psychological effects or problems among those affected. It is because of these latest trends in the aerospace industry that human factors (HF) aspect of aviation will have to become the integral part of the future aviation training programs.

Human Factors in Aviation
In trying to illustrate a point about, or the importance of, HF in aviation, in the thesis I've mentioned above, I argued that HF addresses various aspects of aviation professions. The Greyhound Bus Journey (GBJ) Analogy[5] model below demonstrates the above argument:
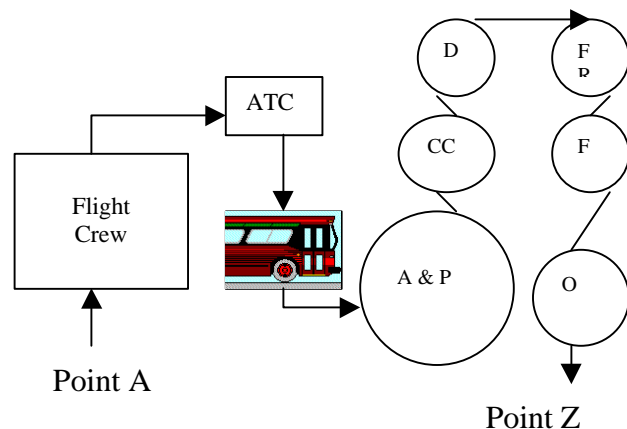

Point A

Point Z

Figure 2: GBJ Analogy Model

Note: ATC: Air Traffic Controllers, A & P: Aircraft Mechanics, CC: Cabin

Crews, D: Dispatchers, FR: Fire & Rescue Service People, O: Others.

The GBJ Analogy simply says HF is like a greyhound bus on a journey, from Point A to Point Z. And, as it moves along, it makes several stops on the way. Some stops (fixations) are longer than others. Also, aside from the fact that the model demonstrates how versatile is HF, it shows which sectors of aviation have been covered by HF and the level of concentration. Thus, the rectangles are areas that have already been studied by HF specialists, whereas circles show those areas yet to be covered. Similarly, the size of the rectangles or circles indicates how long have specialists spent (or will spend) at various areas, the duration of fixation or concentration. Therefore, according to the study I conducted, aircraft maintenance was shown to be the next GBJ Analogy bus stop or the next frontier in HF.

In any case, HF will have to be the center piece of all the future aviation training programs. In particular, HF deals with the human-machine interface, potential hazards likely to result from such interfaces, and possible human behavioral change necessary. But generally it addresses all issues involving a change of behavior. Thus, issues of ethics, environment, and automation are all encompassed within the HF framework.

THE IMPLICATIONS OF CREATING REGIONAL TRAINING PROGRAMS

World historians tell us that for a long time, America, because of its unique geographical location, adopted a position of isolationism. However, they further inform us that over the recent times, the American peoples have abandoned that position. Thus, under the new world order, America got involved with international affairs. Not only that, but the American peoples and government have, like the rest of the world community, realized the need to team up with other countries and form regional cooperations. One typical example of such regional groupings is the North American Federation and Trade Agreement (NAFTA). NAFTA is not the only regional grouping of its type, several other similar blocs exist across the world. Similarly, there are several reasons why these cooperations are formed between various countries.

Reasons for Regional Groupings

In my native language, *Setswana*, there is a saying to the effect that a project is easily achieved through concerted efforts, "*kgetse ya tsie ya tshwaraganelwa*." While various theories may be advanced as to why regional cooperations, I feel the above saying sums it up. In any case, there are reasons why the world is dividing into regional blocs.

Some countries may group themselves into a regional bloc because they share common problems politically, economically, or socially. Thus, coming together as a bloc would boost their efforts to combat the common enemy or address the problem. Moreso, pooling the resources together would enable them to put the situation under control. One such example is the Southern African Development Community (SADC). SADC is a 14-nation regional bloc comprising Angola, Botswana, South Africa, and others. Below is the regional map of SADC.

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Figure3: The SADC Map

JAA *versus* FAA

Naturally, no paper on aviation matters can discuss regional blocs without mentioning the former European Economic Community, now the European Union (EU). As the former name suggests, certain European countries teamed up because they shared common problems of an economic nature. Of more interest to us is that this is, by far, the only regional bloc (outside the US) which has developed its aviation sector to internationally recognized status. The Joint Aviation Authority (JAA), with its Joint Aviation Requirements (JARs), has virtually become a sole competitor to the Federal Aviation Administration (FAA) and its Federal Aviation Regulations (FARs). So, whereas we used to talk of the UK Civil Aviation Authority (CAA) versus the FAA, now it's the Euro JAA versus the FAA. This fact became clear during the recent trade war involving Airbus and American aircraft manufacturers; formerly, Boeing and McDonnel Douglas. It was then that the world of aviation came to realize who are the true role players of the future.

There was another lesson learned from the trade war I've mentioned above. Even though it was basically two American manufacturers against one European manufacturer, the concessions reached were more or less even. This served to show the effectiveness of speaking with one collective voice, how powerful regional groupings can be. Over and above these regional blocs, there are what some business experts call business inter-marital affairs or alliances.

Inter-marital Affairs

Since the Deregulation Act of the Carter Administration in 1978, the aviation industry, in the US and elsewhere, has experienced a lot of highs and lows. World recessions, and other specific problems like the ATC strike of 1981, had their share in the ups and downs of the industry. As a result of all these adverse conditions, the industry explored other means of survival. Initially, they resorted to some forms of partnerships, through code-sharing, hubs and spokes approach, and others. Thus, because of the diminishing resources and worldwide reduction in markets, more air carriers are involved in these kinds of love affairs. This move was further necessitated by globalization. Distance and geographical boundaries are no longer a factor. Consequently, different marriages, mergers, and alliances have taken place and will continue to do so. These kinds of marital affairs should not only be the case within the air carriers, but must also take aboard other organizations like government authorities, regional groupings, and others. Naturally, such love affairs might be characterized by divorces and heartaches. But, nevertheless, in the

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greater scheme of things, they may be worthy of being explored.

Needless to say, aviation training is currently facing similar problems as highlighted above. Resources are becoming scarce, air carriers, FBOs, and government authorities can no longer afford to train their personnel appropriately owing to lack of funds. Some of the LDCs do not have the foreign currency needed to send trainees abroad. For others, the foreign exchange rates against the US dollar may not worth the transaction. Similarly, for those MDCs with established aviation training centers, markets are shrienking. So, in the end, there is no winner, everyone is a loser. This is where the possibility of business inter-marital affairs come into play. Therefore, as we enter the new millennium and consider various options to meet the international aviation training needs, it'll make an economic sense to opt for regional training programs. Admittedly, going this direction will have its costs and benefits, which will have to be weighed accordingly.

Cost-benefit Analysis
So, "What will be the costs of creating regional training programs?" First, there'll be costs to be borne by the LDCs, which are more likely to decide to go this route. Experience has shown that most of these regional projects lack total commitment from individual states involved, both financially and otherwise. Other countries may want to contribute less while expecting to gain more, nevertheless. Another possible problem could be the venue for the actual location of infrastructures. In a situation where governments are not stable, the possibility of the host country seizing the

assets cannot be ruled out. As for the MDCs, they'll certainly lose some of the market if such regional programs were to be created. Alternatively, they may opt to invest in similar projects, only to lose out if and when the assets are seized by a particular member state, the host country.

So far for the costs, now "What about the benefits?" Certainly there'll be some benefits derived from the establishment of regional training programs including the following:
• By creating regional programs, the financial resources will be used within the concerned region and this will boost the economy, locally or regionally. In other words, the money that could otherwise be spent on overseas training centers would be used locally or regionally.
• Even though the individual currencies will differ from state to state, the foreign exchange gap will not be as wide as it would between LDCs and MDCs currencies.
• Through these regional training programs, technical expertise and experience will be built within the region.
• Despite the fact that, most likely, the LDCs will be forming such groupings, for more advanced and specialized training programs, they'll still depend on the MDCs. Alternatively, in certain fields, these regional centers might be more or less like venues only. In fact, some of these regional training programs may only be for the purpose of seminars or workshops. This became an issue after the Lockerbie accident of 1988. The International Civil Aviation Organization (ICAO) identified the need to run regional aviation security-related seminars[3].

In any case, whether seminars or courses, some of the instructors may still have to come from the MDCs. This approach is based on what I call the "teacher to classroom (TTC)" Philosophy. Incidentally, the TTC Philosophy is actually a theory derived from a mathematical argument. It claims that it's cheaper (in dollar terms) to invite one instructor from overseas to teach a group 30 students from seven different countries within a specific region. This way, it becomes more effective and financially viable. This approach, therefore, means that as the LDCs device new strategies of grouping themselves into regional blocs, the MDCs should not view this as a threat or mere loss of the potential market. Instead, the MDCs should equally be creative and concentrate on developing what I propose to call "Modular Mobil Training Packages (MMTPs)." In the same vein, software engineers and programmers, video production engineers, and film-makers, as well as Internet operators, must closely monitor this new trend and develop relevant training packages to be used as MMTPs. With this kind of attitude, the creation of regional training programs may prove to be a win-win situation. Both LDCs and MDCs will be the beneficiaries of such programs.

CONCLUSIONS AND RECOMMENDATIONS

That aviation training has become more costly and complex is an undisputed fact. It is also clear that aviation training has indeed gone through the four cycles and the last cycle, CBT, will dominate the 21st Century. With regard to the latest trends in aerospace, it is my conviction that as aviation experts, we ought to review our attitude toward waste management and recycling of aviation products. Also, it's obvious that HF will form the central nervous system of the future aviation training programs. In this way, human behaviors will be moulded to be in tune with both automation and environmental demands of the new millennium.

Having examined all the implications of creating regional training programs, it's evident the LDCs will be the ones mostly faced with the reality of having to make such choices. This is mainly because MDCs already have established training facilities. Such decisions will mainly have to do with the TTC Philosophy. This means LDCs will organize themselves as regional groups and invite instructors from MDCs to come down and run training sessions at their places. Further, the MDCs should view the creation of regional training programs as a golden opportunity for them, and not a threat *per se*. Consequently, they must be innovative and, together with software engineers and programmers, video production engineers, and film-makers, develop appropriate software programs, video tapes, and films to meet this special need. Furthermore, the effect of information superhighway, with its powerful tool, the Internet, should help to facilitate such programs. In this way, the whole process will benefit all the parties involved. With regard to the problem of commitment to regional projects and possible seizure of assets by the host countries, it is my opinion that the development of such infrastructures must be left to individual states. Other member states must pledge their political will to use the facilities once complete and in operation. A 1986 study of some

21 Sub-Sahara countries recommended that Ethiopia, which already had the training facilities, be the venue for a regional training center[1]. Similarly, after the Lockerbie accident in 1988, regional seminars on aviation security training were determined by the already existing facilities[3]. One such center was established at Penang, China, for the Asian region[3]. Of course, care should be taken not to duplicate the training programs already developed by other members. Also, at the same time, the MDCs must explore the possibility of investing in these regional programs, or going into some forms of partnerships, like buying some shares, providing qualified instructors, contracting management services, and developing relevant state-of-the-art training aids and equipment. Also, as part of the "Global Village," they may simply go and establish branches among those regions, as multinational or multicultural organizations.

I therefore recommend the following:

☞ Creation of regional aviation training programs must be given top priority by both LDCs and MDCs, in the new millennium.

☞ The physical infrastructures for establishing regional training programs must be undertaken by the individual countries, with other regional members guaranteeing to use the facilities.

☞ MDCs, including software engineers and programmers, video production engineers, film-makers, and Internet operators, must concentrate on the development of MMTPs as well as going into partnerships with different regional training programs.

☞ The aviation fraternity must review, or develop, its waste management and recycling policies in order to bring aviation training programs up to speed with environmental demands of the 21st Century.

☞ HF must be the integral part of all future aviation training programs, especially where automation and environmental issues are concerned.

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